

or when you are uncertain about local conditions, you can obtain information from the Ministry of the Environment.

If you contract for a new well, be sure it is of adequate diameter to allow for the installation of a suitable pump to meet your needs for water. The well should be drilled to a sufficient depth so that no water shortages will arise because of seasonal lowering of water levels, or drought. Also it should be deep enough so that trouble does not arise from increasing use of ground water as an area develops.

Every new well should be constructed where it will not be polluted by surface drainage, or wastes from septic tank systems, barnyards or other sources of contamination. A basic guide is to keep it where surface water will run away from it—not toward it. Commercial well seals are required on drilled wells.

Before engaging a well contractor, you should check with your neighbours, or other persons the contractor has worked for, to see if they are satisfied with the service they received. Have a written contract describing the work to be done and setting the price to be charged for the units of work and the materials needed for the well. Retain the right to stop the work if it is not proceeding to your satisfaction, but be sure to discuss fully with the contractor any problems that are encountered or concern you. In this way you work together to obtain a good supply of water.

The well contractor will provide you with an owner's copy of the water well record for your well. This contains a log of the formations encountered in drilling, information about the yield and quality of the water, and recommendations concerning pump capacity and the position of the pump intake.

#### Artificial Interference

If you suspect that the construction and operation of a new, large capacity well has caused your well supply to fail, you should bring your problem to the attention of the owner of the new well to see if steps can be taken to correct the problem. If the problem is not corrected you should provide full details to the Water Quality Branch of the Ministry of the Environment. Staff will investigate the problem to determine the probable causes and steps to be taken to obtain a satisfactory supply again.

#### Enquiries:

**Water and Well Management  
Ministry of the Environment  
135 St. Clair Avenue West  
Toronto, Ontario  
M4V 1P5**

#### Ministry of the Environment

Hon. James A. C. Auld, *Minister*  
Everett Biggs, *Deputy Minister*

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Ministry of the Environment

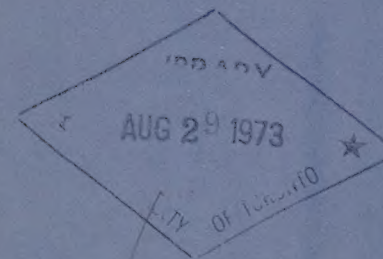
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Publications

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What you  
should know about  
Water Wells





To help you with problems you may sometimes have with your well, this pamphlet gives information on wells, pumps, and some of the conditions affecting ground-water supplies.

### **Wells**

Wells come in assorted sizes and depths—commonly they are just deep enough to penetrate a water-bearing overburden or bedrock formation that will yield water in reasonable amounts. In a number of cases they would yield more reliable supplies if they had been drilled farther into the water-bearing formation, or aquifer. Many shallow wells are constructed by digging or boring and obtain water under water-table conditions. The large diameter of dug or bored wells provides a reserve of water to meet pump requirements where water is yielded slowly to a well. Deeper wells are commonly drilled. Frequently they encounter aquifers under pressure which causes the water to rise in the casing and in some cases even to flow.

### **Pumps**

A great variety of pumps are used to lift water from wells. There is a limit to the sucking capacity of pumps—the practical limit is about 22 feet, but they have a much better pushing ability. Pumps are divided into two primary types—shallow well pumps used where the water can be sucked up to a pump at or near ground level, and deep well pumps used where the water has to be raised greater distances. Then the pumping unit is placed deep in the water of the well, or a device such as a hydraulic jet is used to lift a supply of water to the surface. Pump motors can be located either at surface or deep in the well depending on the type of pump.

### **Ground Water**

Ground water is not a mystery—it follows basic rules and principles. First of all its prime source is precipitation or that portion of it which seeps into the soil and down below the zone of soil moisture. Below the water table all spaces such as the pore spaces between clay or sand particles and the cracks in fractured rocks are filled with ground water. Remember that ground water is moving under the influence of gravity. Where it moves upward as in springs and flowing wells it is because there is a good hydraulic connection with water at a higher level. Under natural conditions the ground water will return to the land surface to supply streams and lakes.

Water is a renewable source. Perennial yield is the amount of water that can be captured by a well and is replaced by natural recharge. Mining of water takes place and water levels drop steadily when withdrawals exceed recharge. This has not been widely experienced in Ontario.

When a well is operating, the water level around the well is lowered in the form of a cone. This cone of depression may extend for many miles under some con-

ditions where large amounts of water are pumped from the ground or it may extend only small distances under other conditions. The water levels in other wells within the area of interference will generally be lowered to some degree if the wells end in the same formation as the larger well.

### **Common Causes of Water Supply Problems** **Pump Failure**

Loss of water supply may be caused by pump failure. Worn-out leathers in piston-type pumps, plugging or corrosion of jets in jet pumps, loss of prime due to leaking foot valves, and motor or control breakdowns are some of the things that may interrupt water supplies while there is still adequate water in wells.

At other times the water level in the well may have lowered to a point where a shallow-well pump cannot lift it to surfaces, or to a point where any type of pump cannot operate without sucking air. In the first case it may be necessary to install some type of deep-well pump; in the second case lowering the pump intake may overcome the water shortage; or it may be necessary to deepen the well or drill a new one so the pump can be lowered.

### **Drought**

Drought lowers water levels in the ground. Shallower aquifers and shallow wells are particularly susceptible to seasonal and long-term changes in precipitation. A lowering of ten to twenty feet from the spring to late fall is not uncommon even during a year of average rainfall. Wells and pumps need to be able to withstand seasonal and long-term changes in water levels.

### **Plugging**

Where wells end in fine sand or a mixture which includes fine materials, a screen should be installed and the well developed to keep the fine materials out of the well after it is completed. The packing of fine materials around or in a well can shut off the supply of water. Development of a well is really surging or overpumping to remove the finer materials so that water can pass into the well easily at normal pumping rates. Flowing wells are susceptible to plugging when flow is shut off, and it is particularly important to screen and develop such wells.

Chemical deposits may also plug a well screen and cause a gradual decrease in yield.

### **Old Age**

Although wells generally will last for many years, they do not last forever. Corrosion of well casings or plugging of wells by soil materials or chemicals shorten their life.

### **Increased Usage**

An increase in the use of water has taken place with modernization of homes and farms. Many wells are not

able to meet the increased demands. When this happens you should consider constructing a new well and installing a new pump to supply the expanding demands of today and tomorrow.

### **Artificial Interference**

Water levels may be lowered gradually over the years or rapidly within a few days because of man's activities. Causes can include the operation of a large number of private wells in a built-up area; the operation of one or more large capacity wells; or the construction of major drainage works or sewers.

### **What To Do**

Give regular attention to your well and pumping system to keep it in good operating condition and to become familiar with the changes that take place from season to season. If you run short of water examine which of the above causes applies in your case and consider the following guides to further action.

### **Pump Failure**

Pump failure may need to be referred to electricians, plumbers, pump suppliers, or well contractors, or the home owner may be able to correct some of the problems. Commonly you will check with the person who installed the pump. When a new pump is installed be sure that it is the proper type for your well, is large enough to meet your future water needs, and has the pump intake set at a depth where increasing water use and seasonal and long-term changes in water levels will not cause further failure.

### **Well Failure**

When a well cannot yield enough water to meet your needs you should consider if the supply can be improved by taking action

- (i) to remove any materials that may be plugging the well,
- (ii) to have the well deepened, or
- (iii) to have a new well drilled.

Licensed boring and drilling contractors can be consulted for advice, and you can discuss with your neighbours what types of wells have given the best water supplies over the years. Well contractors who work actively in an area are familiar with the ground-water conditions and are generally able to offer sound advice about well construction or reconditioning. They are provided with copies of the Ministry's Ground Water Bulletins which list details about wells constructed in the province. These bulletins are also distributed to the offices of the County Agricultural Representatives and libraries at county and larger centres.

When there may be problems in constructing a well to yield adequate quantities of good quality ground water,